REMARKS

Agent for Applicant presents previously presented claims 4, 6-10, 13, 17-21, currently amended claims 1, 3, 5, 12, 15, 16, 22-29, and new claims 30-35 for reconsideration by the Examiner. If any additional fees are required for the new claims or otherwise, Agent for Applicant hereby authorizes the Office to deduct the requisite amount from U.S. Deposit Account No. 502,385.

Specification

The Examiner identified several informalities in the disclosure. Accordingly, Agent for Applicant submits the appropriate corrections by way of the amendments listed above.

Drawings

The Examiner objected to FIG. 8 because of a typographical error. Accordingly, Agent for Applicant attaches an amended FIG. 8 herein.

Claim Objections

The Examiner cited numerous claim objections relating to typographical errors and / or a perceived lack of antecedent in claims 3, 22, 23, and 24-28. Each of these claims has been amended to overcome the Examiner's objections.

Agent for Applicant brings to the Examiner's attention that the amendments above also include corrections for additional typographical errors and minor adjustments with respect to claim dependencies and antecedent language.

Claim Rejections

The Examiner rejected claims 1-12, 14-16, 18-21 and 23-27 on the basis of obviousness over the references Dzwincl, Mooney and Whitton. In response, Agent for Applicant respectfully submits that these prior art references, individually or in sum, do not disclose subject matter such that the present invention would have been obvious at the time the invention was made to a person having ordinary skill in the art, for the reasons stated below. Accordingly, Agent for Applicant respectfully submits that the claims, as amended above, are patentable over the cited references.

Note that the subject matter of claims 2, 11 and 14 have been incorporated into currently amended claim 1. As a result, claims 2, 11 and 14 are hereby canceled and the rejection of these claims is no longer relevant.

Dzwinel teaches a method for direct airborne electromagnetic prospecting involving transmitting many primary electromagnetic fields and detecting any deviation of the primary electromagnetic fields due to secondary electromagnetic fields. The method comprises an induction transmitter loop suspended from a helicopter by means of a safety snap fastener, a shaft with an articulated joint and a supporting frame.

Whitton teaches a towed time domain electromagnetometer with concentric coaxial transmitter, bucking and receiver coils or coils and a means of reducing measurement noise caused by vibration and bird flex.

Mooney teaches methods and apparatus for detecting highly electrically conductive bodies immersed or embedded in a medium having a low electrical conductivity such as sea water, fresh water, sand, glass or rubber. The invention is particularly directed toward detecting underwater submarines. The invention comprises an isolation amplifier 40 and a differential amplifier 42. The isolation amplifier is connected to and receives the current induced in the receiving coil, and amplifies that current to a desired level. This current, with two components (transmitting and target), is then provided to a differential amplifier used to cancel from the electrical signal conducted to it the component for the electrical signal that is due to the magnetic field from the transmitting means.

With respect to the present invention, Agent for Applicant respectfully submits that the term "non-linear" was perhaps confusing in connection with the gain amplifier. The term may have been confusing because although the amplifier is non-linear with respect to its ability to transition gain level, its amplification function is linear for both the low gain and high gain modes, operable for the "ON" intervals and "OFF" intervals, respectively. For this reason, the term "dual-mode" is preferable for describing the gain amplifier. The claim amendments above reflect this change. Further, the specification has been slightly amended to remove references to the term "non-linear", substituting the phrase "dual-mode".

With this in mind, Agent for Applicant respectfully submits that Mooney does not disclose an amplifier having two modes, low and high gain, operable in "ON" and "OFF" intervals, and having the feature fast recovery. The dual-mode amplifier is a feature present in

currently amended independent claims 1, 23, and 29. For at least this reason, the Examiner's rejection of the claims on the basis of obviousness is not sustainable.

More specifically, it should be understood that the amplifier in the present invention is always actually operable in linear mode. However it automatically switches the gain from a very low gain (not necessarily unity) when the transmitter is on and the signal input is thousands of times higher, to a gain high enough so the small signal in the off time can be processed effectively (which can be, e.g., approximately 2000 gain). This must is accomplished by the electronic amplifier design within, e.g., a few microseconds after the amplifier senses the end of the high input signal; the amplifier must settled down quickly into a new linear region so that the early times of the ground return signal (e.g., 10 microseconds after transmitter off transitions and later) can be measured properly.

The prior art references do not disclose the novel dual-mode feature, and instead teach moving the receiver a sufficient distance from the transmitter so that the primary field is low enough to measure, which is required when utilizing an amplifier not operable for dual mode transitioning. For example, see FIG. 1 of Dzwinel, clearly depicting the induction antennae 12 in a spaced-apart relationship from the transmitter loop 9. This approach degrades the system since the optimum position for the receiver is in the center of the transmitter loop. In contrast, the present invention teaches a receiver section substantially aligned with the central axis of a transmitter section. (The Examiner's suggestion with respect to claim 11 that Dzwinel shows this element is accordingly entirely incorrect in this regard).

Agent for Applicant further asserts that Mooney is not a pertinent prior art reference because it is non-analogous art, since the reference is not in the field of the present invention and the reference is not reasonably pertinent to the particular problem with which the present invention is concerned. Specifically, Mooney is non-analogous because it is directed at detecting high conductive bodies immersed in a medium having a very low electrical conductivity, such as sea water or fresh water. Clearly the reference is not in the field of the present invention; Mooney is not directed at geological surveying, let alone airborne surveying. Mooney cites the detection of the position of an underwater submarine as the primary application of the technology, which is discussed at great length, and not geological surveying. Indeed, Mooney expressly differentiates the use of the invention with large conductive bodies such as submarines from the magnetic fields due to geological gradients: see Column 4 Lines 16-27. The particular problem which Mooney addresses is detecting electrically conductive

bodies such as submarines in a lesser conducting medium at depths. Agent for Applicant respectfully submits that these features are separate and remote from the present invention such that Mooney is not a pertinent reference.

It is also submitted that the inclusion of further structural elements, namely that the receiver section is aligned with the central axis of the transmitter section and the sensor means is flexibly connected to the receiver support frame for vibration reduction, in independent claim number 1 further differentiates this claim and its dependent claims from the prior art, further abating any claim of obviousness.

Regarding claim 5, Agent for Applicant disagrees with the Examiner's statement that Dzwinel teaches a flexible support frame. Dzwinel mentions an induction transmitter loop suspended from a supporting frame, but nowhere does it teach a generally flexible transmitter support frame.

Regarding claim 14 and 15, Agent for Applicant disagrees with the Examiner's statement that Dzwinel teaches a sensor coil elastically suspended inside the receiver support frame. Dzwinel (in FIG. 1) discloses using shock absorbers 7 via lines connected between the support frame 4 and the controlling elements 5a. This is completely different from the configuration taught by the present invention, which teaches a shell elastically suspended using a series of elastics attached to points along an inner wall of the receiver frame tubing and elastically supporting the shell.

Regarding claim 16, Agent for Applicant submits that nowhere in Dzwinel is a plurality of interconnectable receiver section frame members disclosed.

Finally, regarding claim 20, Agent for Applicant disagrees with the Examiner's statement that Dzwinel teaches a stabilizer in the form of shock absorbers. The stabilizer of the present invention (depicted in FIG. 6) is completely different in form and function from the shock absorbers in Dzwinel. In particular, the stabilizer stabilizes the movement of the tow assembly during flight, and accomplishes that by way of its aerodynamic design.

Note that Agent for Applicant presents new claims 34 and 35 for consideration by the Examiner. These claims represent structural configurations including all of the elements of the tow assembly present in the previously presented claims, the sum of which are neither anticipated nor obvious. In particular, the suspension and shell configuration are features novel

to the present invention and not disclosed or suggested in the prior art. Agent for Applicant respectfully submits that these claims are novel and non-obvious, over Dzwinel or otherwise.

It is also noted that the problem addressed by the present invention has existed for some time, and the need for a solution has been great given the tremendous interest in devising systems and methods for geological surveying, particularly with respect to airborne surveying. Also, devices and systems such as those generally described in the cited references have existed for quite some time. Yet, not until the present invention has the claimed arrangement been device, which constitutes an ingenious response for the aforesaid problem. Had the present invention been obvious, then it would have been previously devised.

In addition, Agent for Applicant submits to the Examiner's attention that the present invention has enjoyed significant commercial success, having been employed worldwide for a variety of applications. This commercial interest is submitted as a secondary consideration for the purposes of rebutting the rejection based on obviousness. Agent for Applicant asserts that this positive response and surprise by the marketplace is generally suggestive of the inventive step involved in providing the claimed arrangement of the present invention.

For the above-mentioned reasons, alone and in combination, Agent for Applicant respectfully submits that no case of obviousness has been made out with respect to any of the claims.

Allowable Subject Matter

The Examiner stated that claims 13, 17, 22 and 28 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Accordingly, Agent for Applicant presents new claims 30-33, respectively, for consideration by the Examiner.

CONCLUSION:

In view of the foregoing amendments and remarks, the application is believed to be in condition for allowance and a notice to that effect is respectfully requested.

Should the Examiner not find the application to be in allowable condition or believe that a conference call would be of value in expediting the prosecution of the application, Applicant requests that the Examiner telephone the undersigned Counsel to discuss the case.

Applicant requests an opportunity to submit any Supplemental Amendment that might advance prosecution and place the application in allowable condition.

Yours faithfully,

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